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The Student Labor System in Agricultural Colleges—A Symposium.

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In presenting a few thoughts upon the labor system, as connected with courses of study in agricultural colleges, it is fair to presume that its advantages are great, from the fact that the most notably successful of such colleges have adhered to some such system in spite of numerous obstacles to its adoption and more difficulties in maintaining it. This presumption is strengthened by the fact that a large majority of trained thinkers who have had the advantages of such a system favor some form of the system in plans for their own work in managing such courses. Some of these advantages may be very briefly suggested.

Not the least is the cultivation of respect for energetic effort and consequent appreciation of the actual toil needed in every kind of life. Another is the encouragement given to readiness in any undertaking without reference to the amount of physical energy required. When the routine of life includes such labor, toil anywhere seems easier to undertake, and muscular exertion is a pleasure rather than a hardship. Better still is the spirit of usefulness gained—the best possible incentive to an energetic and philanthropic life. Nothing is better to develop this spirit than actual use of one's power in youth upon the obviously useful work of the world. Again this helps to develop that practical judgment which makes the efficient man in every calling. The decision of character which is brought by judgment exercised in labor where the results can be at once perceived is most sound. All these are general in their

nature, connected with such work anywhere.

There is another class of advantages growing out of an evident adaptation of such a system to an outline of study. The sciences are real as they contemplate nature with reference to humanity. The difference between truth and fancy appears in the effort to apply the generalizations of science. The student who works out problems in the art of moving things to accord with nature's laws is in the best possible condition to appreciate accurate observation and correct reasoning. Science is not only better applied, but is more really science from this actual relation to the handling of things which concern our life.

The arts of life are absolutely dependent upon some such training and continuous occupation, since, not only knowledge, but dexterity and skill are essentials. These will never be gained except by definite coupling of elementary efforts with the hands to the acquirement of knowledge by thought. I believe that the efficient observers in our experiment stations taken from the ranks of those who have had such training, owe not a little of their efficiency to this union of thinking and doing.

I know that many difficulties stand in the way of gaining these advantages, and can not say that anywhere a perfect system has been reached. It often happens that unnecessary friction between officers and students, or carelessness, or intention upon the part of the students, or conflict of interests among the students themselves may prevent their taking interest in the work. Sometimes a traditional opposition is cultivated without reason, and careless management interrupts the even progress. Often the toil seems too prominent and the dexterity and skill little

thought of. Sometimes the very expense of overseeing such a force as the system implies, stands in the way of justice to the system. Indeed, it will always require a rare talent in those directly responsible for such work to adjust these requirements to the abilities and opportunities of students.

In spite of all this it seems possible to adjust methods to the actual accomplishment of the ends in view with varying success according to the ingenuity exercised. There must be study to contrive real work that will fill the daily routine and, if possible, show the actual proceeds of such labor, and to make the students feel that they return an equivalent for what they receive, and receive an equivalent for what they give. Such work is wisely graded for reputation's sake, and if the college has a system of marking in intellectual duties it is well to extend it to the labor. Above all, responsibility must be cultivated to the utmost so that strict business rules apply to the every day action. At the same time the managers of such labor are obliged to consider the personal characteristics of those under them, and keep uppermost the less evident results of labor in the students themselves. The driving foreman who can work a gang to the greatest effectiveness is likely to overlook the chief end of such training; and on the other hand the easy going foreman fails to develop the genuine energy which makes a large part of the usefulness of the system.

It is wise to keep up a mutual interest between the teacher and the overseer of the labor. When they can be the same person, the highest efficiency is gained in the adjustment of thought to effort; and the faculty in such an institution needs to cultivate that unity of spirit that upholds both sides of the training.

The best of judgment is needed in adjusting the amount of labor required to the peculiar circumstances under which the system is operated. Whether three hours or one hour a day is sufficient will depend

wholly upon circumstances. With a proper understanding of the objects to be gained, ordinary wisdom will devise the plans and the extent. The "will and the way" will come together anywhere.

—
 PROF. S. T. MAYNARD, MASSACHUSETTS AGRICULTURAL COLLEGE.

The question of manual labor in our agricultural colleges is one that has received much thought and caused much discussion, still the problem seems unsettled in most of them. In some, manual training is made compulsory, while in others, the skill and training received by the students in the use of tools and in the methods of growing and handling farm products, depend upon the inclination or necessity of the student.

In the first case if the method of instruction consists of a repetition of ordinary work with ordinary tools, and without special instruction as to the reasons for the various methods of doing the work, it becomes irksome and of little value, and the students soon learn to dislike and avoid the exercise, and perhaps lose their enthusiasm for the chosen calling and get switched off to something more entertaining.

If, on the other hand, new methods are discussed and tried, new implements used and a variety of work presented, interest will be awakened; the students instead of being driven from the farm are more and more attracted to it. Many a young man who has entered college with the idea of becoming a farmer has been led away to what seems at the distance to be the more attractive calling because the manual labor system was not made attractive.

In all of the most important and successful industrial schools and colleges of the country, the fundamental idea is to give their graduates a thorough knowledge of the sciences relating to, or necessary for, success in their calling, making the application of laws and principles to the materials and

forces employed in their various callings of the greatest importance, until they become masters of their trades or arts. This is illustrated by the schools of mines, of civil and railroad engineering, of electricity, of mechanics, of carpentry and other industrial technical schools.

Here the practical application of the principles of the related sciences is made equally important with the text book study of the sciences themselves and all students must become familiar in a practical way with the materials, forces and implements used in their calling. In other words they must become skilled and intelligent workmen. To obtain advanced positions immediately after graduation, which is the aim of most young men who attend industrial schools and colleges, full and thorough training is required and most of the young men are fitted for such remunerative positions upon graduating from most of these schools.

This practice it is claimed may be somewhat at the expense of a broad and well rounded educational foundation for life's duties. But the time devoted to the study of elementary principles, if illustrated by their application to the forces and materials of any industrial or even professional calling, will result in greater progress than where the science and the practice are taught separately, so that more real progress will be made and even more ground be covered in a given time.

It may be claimed that more skill and training in the manipulation of the tools and machines of other industrial arts are required than in agricultural pursuits, but if one will only consider the special skill and judgment necessary in the breeding and care of our domestic animals, in the growth of farm and market garden crops, in the cultivation of fruits, or in the care and successful growing of vegetables and flowers under glass, it will be seen that the successful men in any of these branches are

those who possess great skill and judgment that is only obtained by constant and earnest effort, and that such effort and skill are as liberally rewarded in agricultural pursuits as in any other. Agriculture, which is the most complicated of all of the arts or industries of man, requiring a knowledge of a greater number of the natural sciences than any other, is no exception to the conditions which exist in other industries, and if in all other industrial schools and colleges it is found that practice must go hand in hand with the study of the sciences from the book, it follows that the best results will also be obtained in those agricultural colleges where manual training is an important part of the curriculum.

As a rule the curriculum of our agricultural colleges is so much crowded, and necessarily so, that the time for the completion of the prescribed course is far too limited. We are trying to make specialists and well rounded, liberally educated citizens in the time allowed in many technical schools for the mastery of only one or two sciences and their application to a narrow field of employment.

It seems, however, impossible, with the tendency of the times to run to specialties, to extend the course to more than four years, and our efforts must be directed to the better preparation of our students in the public and preparatory schools, and to the most thorough and practical work in the short time allowed, relying upon the manual training during the course to illustrate the principles and make practical the sciences involved and thus gain the requisite skill and broad education in the shortest time.

The broad-minded, liberally educated agriculturist, who spends his time in contact with nature, has always been a power for good in this country and the world, and everything possible should be done to fit our students for success in this calling and to preserve and foster that love for the work that will keep them upon the farm and show

them the great blessings of their independent calling.

—
 PROF. THOS. SHAW, ONTARIO AGRICULTURAL
 COLLEGE.

This is confessedly a most difficult question. While nearly all those who have studied it are agreed that some labor should be done by students attending these colleges, there is by no means a consensus of opinion as to the amount of it that will best serve the intended end, as to the best mode of distributing it, and as to the amount of the remuneration that should be given for it.

There is no doubt in the mind of the writer that labor should at the present time be required, to some extent, from students who take a full course at these colleges, for the reason, (1) that unless they do some manual labor it will soon become distasteful to them, (2) that they will not become more efficient in performing it, and (3) that its health-producing and health-sustaining effects will so far be lost.

When manual labor ceases to be performed altogether a habit of the system is induced which makes it difficult to take it up again, hence the young men thus situated begin to look about for a situation in some other line of life. Turning their footsteps away from the high vantage ground which agriculture furnishes for distinction and preferment, they go down into the arena of the professions or to some lower level, and bury themselves in that broad plane of obscurity where there is scarcely room even for the graves of the unambitious dead. They feed all their days upon the dry husks of mediocrity, when otherwise they might have eaten the bread of distinguished attainment while laboring within the domain of agriculture—a science, the height and depth and length and breadth of which have not as yet been measured by any measuring line of man.

Unless the young man who intends to farm is diligent in acquiring the art of performing manual labor well at the proper

age, the time for doing this soon goes by, and, like the snow which melted at the close of last winter, it never comes again. I hold it as greatly important that the man who is to live by farming should himself be a master in the performance of the manual labor required there, and that he who is to direct manual labor on the farm, will do so more efficiently if he is able to perform it better than any man in his employ, nor does a professor of agriculture form any exception to this remark. To be able to apply brain-power to the performance of manual labor in its minutest details, either in the individual himself or in those whom he employs, is one of the highest attainments of the farmer. It is the ability to do this which makes the chief difference in the quality of the manual labor performed. It is no doubt the explanation of the fact that one man, both in the quantity and quality of the work which he does, comes up to a high standard every time, while another man of equal physical strength is in both of these respects provokingly deficient. In the one instance we have the result of the directing power of mind on muscle so constant in its exercise, that eventually the power to do manual work well becomes an inwrought habit. In the other, we have the result of the outgoing of muscle in action about as mechanical in its movements as though it constituted a part of an inanimate machine.

The effects of manual labor upon the health of the student are very beneficial when it is properly regulated. Otherwise these effects may be equally baneful. In respect to health, under proper conditions, it will prove more helpful to young men than even college games of an athletic character, for the reason that in the former instance, exercise is taken in a moderation that is helpful, while in the latter it is frequently of so violent a character that its influences are hurtful. In relative importance there need not be any doubt as to which of these attainments the precedence

should be given, for surely no one will be found so supremely foolish as to say that the end of being is better subserved by ability to kick a foot-ball well, than by ability to turn over a splendidly laid plough furrow. Let all the young men therefore, who attend our agricultural colleges, regulate their ambition accordingly.

Since, then, one object of manual labor at agricultural colleges is the maintenance of health, it is clearly wrong to ask the students to perform any work that will either prove prejudicial to the health or that will hinder study. This would exclude some kinds of labor from the list, as threshing and chaffing dusty fodder. That man has not yet been found since the world began, who can thresh for half a day and then go to his study and do efficient work. I know that old and well-meaning farmers will feel inclined to say, "Make the lads work, and let them have it as it comes," but old and well-meaning farmers even can easily make themselves appear ridiculous by what they say. It does not necessarily imply a cowardly spirit on the part of a young man who desires to avoid the performance of any kind of work that will hinder his success in study, and the performance of such work should not be asked of him.

While it is desirable that students in regular attendance should labor to some extent at least, one class of students may, and should be admitted, of whom this should not be required. I refer to those who come from farm homes, with the object of taking lectures only in certain lines of agriculture, or in some of the sub-divisions thereof. There is not much danger that these young men will lose their love for manual labor. In the fact that they have chosen a special course we have a sufficient guarantee that they are determined to equip themselves in the furnishings that relate to a department of agriculture which they have already decided to follow with a fixity of purpose from which they will not be turned aside.

Labor with them should be optional, and because optional it should go without remuneration. It should not be the aim of agricultural colleges to take in hand raw recruits and turn them out proficient in doing farm work within the limited time usually allotted to the college course. Indeed it cannot be done. It cannot be done, first, for the reason that the time is too short. A man may become expert in performing labor in some branch of mechanics in from two to three years but he cannot in the infinitely wider field of agriculture. It cannot be done, second, since the raw material referred to usually comes from the cities, or from lines of life not much acquainted with hard bodily labor. Such persons are therefore to some extent incapable of readily taking up with manual labor, since they have never possessed those habits of labor which at an early age become as it were an essential part of the existence of a farmer's boy. No young man should be permitted to take a regular course at an agricultural college, who has not spent at least two years at the every day work of the farm. Anyone who graduates with honors from such a sifting process is likely to make a good agricultural student and also a good farmer.

The amount of labor required at our agricultural colleges should not, if possible, be allowed to hinder the progress of the student in his studies. I would be disposed to fix this amount at four hours per day, every alternate day, and to say that it should always be rendered in the afternoon. This enables the student to attend lectures in the forenoon when the physical powers have not become jaded with toil. It gives him the latter portion of every alternate afternoon to spend at games or in the gymnasium, and also prevents him from losing that love for farm labor without which the average individual will not succeed as a farmer. More than four hours of labor at one time may so exhaust the physical powers that the effort to study in the evening thereafter will prove

a failure. Those who have any doubt on this point have only to go down into a gravel pit on a wintry afternoon and shovel gravel for four or five hours in succession, and then try to study the remainder of the evening, to be convinced of the correctness of this assumption. Were it not for the hindering effects of hard daily toil upon the activity and efficiency of the thought of the farmer, no class of men in the world would be able to stand before the farmers. The farm is beyond all question the best place in the world for strength of brain-production, but it does not occupy the position which it should for brain development, and for the reason just given. Anything, therefore, in the line of physical labor, that hinders brain-development at an agricultural college should be avoided.

The *distribution* of labor at these colleges is a difficult question. It is felt more at those of them which have no summer term. To find labor which will profitably employ all the students of an agricultural college in the season is no light task, and to furnish labor that will enable them all to change in a regular and unvarying succession from one department to another is still more difficult, as some departments require more help than others. This difficulty will increase with the lapse of years, for, as those go by, there will be a great increase in the attendance of students, if our agricultural professors quit themselves like men. When the wild seething prejudices of the farmers as to the non-utility of agricultural colleges shall have subsided by casting into them the salt of common sense, there will be an influx of students to these colleges such as the world has never thought of. When the graduates shall go back again from these colleges to the farms and beat their neighbors at practical farming—and shame on them if they fail to do this—there will then not be room to accommodate the students at these colleges, much less will there be opportunity to provide a proper distribution

of labor for them. In the meantime it is important that the farmer student be allowed to give much attention to carpentering and blacksmithing where the facilities admit of this.

The question of *remuneration* is one of ever-growing difficulty. The teachers of the future will have to grapple with it more and more. When that better day comes, and it is sure to come, which will find the farmers as enthusiastic in support of agricultural colleges as they are indifferent now, it is more than probable that paid labor will of necessity have to be abolished altogether. With one thousand students at an agricultural college, what could be done by way of finding employment for all of these on a single farm? Why should this be looked upon as an incredible thing? Is the world to swing on and grow hoary and die without any agricultural millennium? The college faith that does not look for this is no faith at all; the professors who do not toil for this are no professors at all; and the students who do not labor for it are no students at all. Why, if one farmer father in Michigan out of every one hundred were willing that his farmer boy should be given a chance in the great race of life with those who are making for the professions, you would have more than one thousand agricultural students at Lansing to-day. It is very clear then that the question of the payment of student labor will one day become so burdened with difficulties as to lead in all probability to its abolition. In the meantime let the students in regular attendance both labor and get pay for it, according to its worth, no more, no less. It should be paid on the basis not of what other students get, but of what it would cost to get it done by the ordinary laborer. The variations in the amount given should be sharply drawn. The lout, whose labor consists in motion without progress, should be paid accordingly. Those who elect to be inefficient should get a similar amount, and those who

are inefficient without design should get precisely the same. They should all share and share alike, that is they should get nothing. This is the only form of payment that would be just to these, for, if they were taught nothing else by it they would be taught this, that they had very probably chosen the wrong calling. On the other hand the young man who labors faithfully and effectively should be well paid.

Labor, special in its nature, and of more or less permanency in its character, should have no place at our agricultural colleges, especially if such labor is paid. It is a form of discrimination unjust to those students not so employed, and its effects cannot but be baneful.

Labor that is performed for the sole purpose of receiving instruction should not be paid. The payment of such labor would put a bonus on learning that would be wrong in principle and demoralizing in its tendencies. The little attention that this important feature of outdoor work receives at our experimental farms is at once a weakness and a want. It can only be remedied by increased provision for giving instruction and by making it obligatory that those requiring it attend upon it. When instruction in the college and on the farm are what they ought to be, then will our farmers be convinced by the results that there is a difference between the man who takes up his life work furnished with all that the agricultural colleges can give him and the man who is not so furnished.

A Brief History of the Microscope.

V. H. LOWE, PHI DELTA THETA FRATERNITY.

Like many other instruments used in scientific investigation the early history of the microscope is wrapped in obscurity. Not even its discoverer or the date of its discovery are positively known, but as its simplest form consists of a single lens made of glass or

some highly refractive material, it is not unreasonable to suppose it may have existed even before the Christian era. Indeed we have more reason than this to believe in its existence among the ancients, for in the writings of Aristophanes, we read that "burning spheres" were sold in the market places as early as 400 B. C. Seneca, a writer in the first year of the Christian era, is credited with having first observed that small, indistinct objects appear larger when viewed under a glass globe filled with water. Pliny also mentions the burning properties of lenses made of glass, and Ptolemy shows that he had some knowledge of the principles of microscopical construction, for he uses the word refracting in his work on optics. No importance, however, was placed on the microscope as an instrument of investigation until the thirteenth century, when Roger Bacon, the celebrated discoverer of his time, astonished the people of Oxford by the revelations of his wonderful glass. For some reason no one seemed inclined to experiment in this line, and so the pages of history contain nothing more in regard to the microscope until the sixteenth century, when it appeared in the compound form, that is, supplied with two or more magnifiers. Again there is considerable doubt as to whom the discovery is due, but the weight of opinion seems to be in favor of Hans Zansy or his son, Zacharias Zansy, both of whom were Dutch spectacle makers. Their instruments are described as being six feet in length, consisting of a copper tube about six inches in diameter supported by a brass pillar on a base of ebony which was so arranged as to hold the object to be viewed.

With the foundation of the Royal Society in 1660, begins a new era in microscopical science. The early volumes of the Transactions "literally teem" with descriptions of new instruments and improvements in the old. Inferior to none of its time was the microscope constructed by Robert Hooke, who appears to have been one of the earliest

contributors. His paper on "The Physiological Description of Minute Bodies Made by Magnifying Glasses," has been styled one of the wonders of the day. His instrument consisted of three lenses properly adjusted in a frame. To this frame was attached a globe filled with salt water and placed directly in front of a lamp, the pencil of rays being received by a plano-convex lens, placed with its convex side toward the globe, thus condensing the pencil upon the object. Hardly had the excitement over Hooke's triumphs subsided before Leeuwenhoek, the Dutch microscopist, made known the results of his labors. So wonderful his discoveries, so simple the microscope used, that the world has never ceased wondering at his genius. His instruments were of his own invention, and consisted of a single double-convex lens placed between two silver or brass plates perforated by a small hole before which a movable pin supported the object to be examined. Each instrument was adapted to the study of one particular specimen, hence the inventor often had a large number at one time. Leeuwenhoek's success with the simple microscope brought that instrument into great favor and for some time experiments with the compound form were dropped. Prominent as improvers of the single lens microscope are the names of Malpighi, Lieberkuhn, who, by means of his attachment for viewing vague objects, made many important discoveries in the construction of the mucous membrane lining the alimentary canal, Swammerdam the botanist, Lyonnet, and Ellis.

To Eustachio Divine we are indebted for the discovery of a certain combination of lenses termed doublets, which consist of two plano-convex lenses placed so as to touch each other in the middle of their convex surfaces. "This instrument," it is stated in the *Philosophical Transactions* of 1688, "hath this peculiar, that it shows the objects flat and not crooked, and although it takes in much, yet nevertheless magnified extraordin-

arily." The subsequent improvements of John Herschel, David Brewster, Mr. Codrington, Dr. Wollaston and others gave us the forms in use at the present time.

No further important improvements in the compound microscope are recorded until 1812, when Sir David Brewster devised a method whereby both simple and compound microscopes were rendered achromatic. Mr. Brewster's method is described by Quekett as follows: "Starting with the principle that all objects, however delicate, are best seen when immersed in fluid, he placed an object on a piece of glass, and put above it a drop of some kind of oil having a greater dispersive power than the single or concave lens, forming the object glass of the microscope." "The lens was then made to touch the fluid, so that the service of the fluid was, as it were, formed into a concave lens, and if the radius of the outward surface were such as to correct the dispersion, we should have a perfect achromatic microscope both simple and compound." The experiments of Professor Asnice, Dr. Goring and Mr. Cuthbert upon the achromatic objective resulted in bringing that instrument into greater popularity than it had ever known before. In 1830, Dr. Joseph Lister published his observations on certain properties of achromatic combinations, which had before been unnoticed. The principles and results obtained by Dr. Lister enabled him to form a combination of lenses capable of transmitting a pencil of 50 degrees with a large field correct in every portion. These improvements have resulted in raising the compound microscope from its primitive and comparatively useless condition to that of being the most important instrument in the hands of the investigator of nature.

Of more recent improvers in the microscope the names of Powell, Ross, Smith, Beck and Zeiss of Europe and Zeutomayer, Spenser, Bosch, Lomb and Bullock of the United States are prominent.

SCIENTIFIC.

ENTOMOLOGICAL WORK.

The rapid increase in work and workers, owing largely to the establishment of experiment stations in the several States, through government aid, is rapidly developing new facts in both economic and scientific entomology. It is gratifying to know that our own college, and especially our several graduates, are taking no mean place in this important field of research. Important facts regarding kerosene emulsion have been developed at our college, as exemplified in Bulletin No. 73, recently issued. The most desirable formula for this important insecticide, both as to the perfection of the emulsion, and to ease of forming it, originated here. Professor Gillette, now of Colorado, has shown that this valuable insecticide is a specific in the treatment of the various species of lice that attack our domestic animals—the horse, hog and cattle—and also the ticks that are so serious a disturbance in sheep husbandry.

The use of the arsenites to protect against the ravages of the codling moth, was first proved effective and safe at this college. It was here that they were also proved to be safe, even though stock were pastured in the orchard during the time of spraying, in case the spraying were properly done. It was here that late spraying was first shown to be more harmful than early. It is well known that the arsenites, especially London purple, are often quite injurious to foliage. Professor Gillette has discovered that by use of strong lime water or Bordeaux mixture instead of pure water the injury is much lessened, so that these substances are safe, even when used on the peach. Professor Gillette has also shown that white arsenic is almost entirely safe to use on fruit trees, so far as injury to the foliage is concerned, if used as soon as mixed, while the same gentleman has proved that with delay it is even worse than London purple to blight the foli-

age. Prof. C. M. Weed has tried the arsenites with considerable appearance of success in preventing the ravages of the plum curculio. Others have not succeeded so well. Should Mr. Weed show how the curculio can be held in check by the use of London purple or Paris green, he will do a very valuable service. Mr. Weed was one of the first to try the copper compounds in connection with the arsenites, thus combining our best insecticides and fungicides, and destroying insects and fungi at one and the same time. Professor Gillette has shown that old, worthless pyrethrum can be partly if not wholly restored by grinding, and was the first to use pyrethrum and the kerosene emulsion together, by using a decoction of pyrethrum instead of water in making the emulsion. This substance was also used by Professor Menke, of Arkansas, who was the first to publish the fact. Professor Menke's experiments, however, were made by Mr. G. C. Davis, in the cotton-fields of Arkansas. This pyrethro-kerosene emulsion was found by Mr. Davis to be superior to the emulsion alone. That kerosene emulsion will destroy plant-louse eggs, as well as plant-lice, was first found out at this college. As the viburnum plant-louse, the plum plant-louse, etc., etc., so speedily cause the leaves to roll, this discovery is doubly important. Such early spraying is not only more effective, but is applied more easily and economically, and as it may be safely used in more concentrated form, there is added another element of success. This college was first to show, a year ago, that tobacco decoction is a preventive of the terrible destruction of the cucumber flea beetle, which is so great a pest to the potato grower, as well as the general gardener. Professor Gillette has discovered and described several new insects, and is becoming our first authority in the Family *Cynipidæ*, or four-winged gall flies. Mr. Ward has worked out the life history of several insects, before unknown, and is doing excellent work in the group of arachnoids

known as harvest men, or grandfather gray-beards. Mr. Weed has also described many new parasitic insects. Mr. J. C. Duffy has also worked out the life history of some very minute and interesting insects, which bear very closely on economic entomology. Mr. Duffy has charge of the practical entomology at the Missouri Botanic Gardens at St. Louis. Prof. L. H. Bailey has invented a spraying nozzle which promises to be very convenient.

TWO COMMON SPIDERS.

Much has been written about the common garden spider, *Epeira vulgaris*, the well known member of that large family of spiders, the Epeiredæ. Although the family is a large one the members are so much alike that each bears all the general marks and pursues much the same kind of industry as the others.

On almost any bright day in spring or summer they can be found busily at work on their webs, which are often of enormous proportion, sometimes covering the whole side of a shrub or stretching between two bushes several feet apart. They are reddish-yellow in color, marked on the upper side of the large abdomen with dark lines that have been compared with the cross of St. Dennis. If you are fortunate enough to be on the spot just before the spider begins the construction of its new home, you may find it on the branch of some shrub making preparations to begin work. A silken thread is soon put forth and, being caught by the slightest breeze, is carried to a neighboring branch to which it clings. Carefully fastening the first end the spider cautiously tries the thread to see if it is strong enough. Being satisfied that it is she crosses to the other end, fastening in turn to the branch on which it has caught. Similar threads are stretched to neighboring twigs in such a way as to form a polygon.

This done she returns to the line first thrown over and, stopping exactly in the

middle, drops, head downward, hanging to a thread which divides the polygon exactly in two. At the central point is fixed a fleck of silk which holds the rays diverging from it. The frame is now made but there is yet more to be done before the web is complete. Sticky threads are stretched from ray to ray, being attached to the fleck of silk in the middle and passing round and round from ray to ray and reaching clear out to the exterior. The work is finished by returning in a similar manner from the circumference to the center.

Accidents often happen to the web of the epeira. A gust of wind, a falling branch, or the stroke of some bird's wing may cause considerable damage. But the skillful spinner does not seem at a loss to know what to do in a case like this, for in a very short time the broken threads will be replaced and the whole web as good as new.

When attacked the epeira holds itself in the middle of the web. If an insect strikes the net work it is soon completely entangled in the sticky threads attached to the rays. At the end of summer the female deposits her eggs in a cocoon made of different kinds of silk from that of which the web is constructed. The mother hides the precious bundle for she must die in autumn, leaving all to the mercy of her enemies. The young spiders hatch the next spring, remaining together for a few weeks but finally separating to build new homes for themselves.

Another spider with which we are all more or less familiar is the common house spider, *Tegenaria domestica*. Its desire for the warmth and protection afforded in the living room of the household is shown by the persistence with which the delicate webs are spun and respun in some upper corner of the room. Were it not for the large amount of dust which accumulates in the meshes the web would be pure white. This dust however does not seem to give the proprietor any concern for no effort is made to remove it.

The domestic spider is timid and so has a place of refuge which consists of a roomy hammock fastened beneath the web in such a way as to be easily accessible. The eggs are deposited in a silken cocoon, which is carefully guarded by the mother, who frequently goes without food for some time, remaining to protect her charge. When the young have hatched the half starved mother leaves them to take care of themselves for a time while she makes a hearty meal on the flies caught in the web.

This species is seldom found in hollows of old logs or in secluded portions of rubbish piles so frequently inhabited by other species. They prefer the shelter and protection of houses where they are free from cold and storm.

"Insects and Insecticides" is the title of a book just published by Prof. Clarence M. Weed of the New Hampshire College of Agriculture. Mr Weed graduated from this college in '83, and was appointed to the entomological experiment station at Columbus, O. He remained some years until accepting the chair which he now holds in New Hampshire. Prof. Weed's book is a practical manual of noxious insects and contains a complete list, with methods of application of insecticides, used in their destruction. It contains 276 pages, and is divided into six parts, treating of insects affecting larger fruits, small fruits, shade trees, ornamental plants and flowers, vegetables, cereal and forage crops, and insect pests of domestic animals and the household. Seven full page plates and numerous cuts illustrate the subjects treated.

We quote the following from "College Reading" in the *College Rambler*: "Try to see into the reasons of what you read, to understand clearly why you like a book which pleases you. Analyze the author's mind, as he reveals it. Think over his hints as well as his full statements. By and by you will find more things that you can like, more that appeal to you. Some of your first favorites will have lost their attraction, some will be more pleasing. Hold fast to these last and continue reading and studying others."

THE SPECULUM.

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AGRICULTURAL COLLEGE, JUNE 10, 1891.

WE call the especial attention of our readers to the articles in the literary department of this issue under the title of "The Labor System." They are written by men who have had much practical experience with the problem, and will be worth the careful perusal of all to whom the labor system has been a subject of thought.

THE loss of Dr. Durand from our faculty is in more than one sense a misfortune. His personal popularity among the students, his interest in all phases of student life, his wide range of culture, the fact that the Mechanical Department in a large measure has been built up around him and by him—all these make his departure to be regretted. We can not help but ask, why should it be so?

Why should we lose a man so thoroughly a part of our institution?

WE excuse the meagerness of the editorial column in this number, by saying that other matter in a measure crowds it, and also that there seems to be a drouth of material just at present. The fellows are doing well; the faculty appear to need no instructions (?); the Board silenced us by their recent kindly speeches in chapel; the legislature has not yet committed itself sufficiently to bring down upon its head our blessings or cursings. Such calmness of atmosphere does not induce rapid growth of the editorial grain.

FIELD-DAY, with its triumphs, glories, tin horns, sore throats, and magnificent home-coming has come and gone. M. A. C. was unusually successful in winning prizes. The details will be found in our athletic column. It will be well if those who expect to contest another year, begin their training now, not allowing themselves to once get out of condition. To this end it might be well to have a local field-day in the fall and another in the spring, thus keeping up interest, and better, keeping before the fellows the need of constant steady training. With such care our fellows will be nearly invincible in future.

COLLEGE NEWS.

Attendance at Chapel is now voluntary.

Several of the class of '90 were at Field-Day.

Miss Gussie Hillyer is the guest of Miss Lucy Clute.

P. G. Holden is spending a week at his home in Oviatt.

The geometry class made good progress under Mr. Fox last term.

Material has been purchased for the equipment of a drum corps.

Extended improvements are going forward in the chemical laboratory.

Were it not for the Sophomores, summer "Freshmen" would be scarce.

Mrs. James Hine of Detroit was the guest of Miss Sinclair, Monday, June 8.

A large number of Florida plants have been added to the college herbarium.

The waste water of the well will be used to flood the pools in the wild garden.

L. H. Baker has re-entered college this term, and expects to finish with his class.

President Clute delivered an address at Ovid before a farmers' picnic, Friday, June 5.

A large committee composed of Senators visited the college Thursday, June 4.

The Board authorized the purchase of a road machine and also a threshing machine.

H. W. Mumford is to have charge of the freshman class in English Grammar the remainder of the term.

Clayton Cook will not enter college for a few weeks on account of serious trouble with his eyes.

Five hundred dollars worth of electrical apparatus has been purchased for the physical department.

At the recent meeting of the State Board all were present except President Wells and Governor Winans.

A. L. Waters, who has been attending the State Mining School, recently spent a few days at the College.

Miss Florence Green and Miss Jessie Lathrop of Grand Rapids were the guests of Mr. Greeson, Saturday, June 6.

One of the favorite Short-horn cows was killed by lightning during the storm which occurred Monday night, June 1.

Our chapel has been deprived of its sober and long-faced appearance, and has assumed an attractiveness which is appreciated by all.

The Hesperian Society Hall has lately been painted and papered, making it a very pleasant room. A new piano has also been purchased.

The dynamo in the iron shops has been busy for some time in charging the storage batteries for the chemical and physical departments.

The reception of our athletes by music, rockets, illuminated houses, etc., both in Lansing and at the College, bespoke interest which the students appreciate.

Seniors are discussing the question whether they do away with class day exercises. If they do they will substitute in its place a lecture by some noted speaker.

Prof. Davenport was recently offered the chair of Agriculture at the Ohio State University at a salary of \$2,250 per year, but we are glad to learn the offer was not accepted.

It will be a pleasure to the many friends of W. A. Fox to know that he was successful in securing the position of county superintendent of schools. He expects, however, to return toward the last of the term and graduate with '91.

The time of the Senior botany class has been changed from 9 to 11 A. M. to the afternoon from 3:30 to 5:30 to accommodate a few who wished to take Political Economy.

Mr. G. H. Hicks takes Mr. Toumey's place as assistant in the Botanical Department. Mr. Toumey goes to Arizona as Botanist of the Experiment Station at Tucson.

As usual nearly all the boys and all but three of our ladies went to Olivet College to attend Field-Day. We were also glad to have with us some of our Professors.

Several books have lately been returned to the library from the bindery, sixty two volumes have been added by purchase, and forty-three by donation since our last issue.

Quite a number of the students attended the Memorial Day exercises in Lansing, but did not feel anxious to give up the whole day for the privilege of displaying their "brass."

Dr. Durand has resigned his position and goes to Perdue University next fall; his duties will be more restricted there and he will have a better opportunity for individual research.

Mrs. S. C. Dundore arrived at the college May 28, to remain until after commencement, when she will accompany "Sam" to southern California, where he expects to engage in fruit culture.

Prof. C. T. Grawn and family of Traverse City will occupy two rooms in the house recently vacated by Prof. Simpson. Prof. Grawn comes to pursue special lines of work in chemistry and physics. Prof. Hewett and family of Three Rivers will occupy two more rooms in the same house.

The experiments with insecticides are to be much more varied than in former years. Apple and plum orchards are being sprayed with different mixtures and solutions in the regions of Grand Rapids and Pontiac, under the direction of the Entomological Department.

Where a student does much traveling it is necessary that he should know the rules of other colleges as well as his own. For fear some one should again be led astray we might say that the third story of Shipherd Hall is not for boys, neither can anyone room there unless they wear dresses.

The Seniors who elect work on the farm are to carry on experiments in the feeding of stock. It is unnecessary to state that this is a method which will tend to increase the interest of the student in his work, a much needed reform in the work system, and at the same time be of practical benefit to the student himself.

An English paper has started a foot-ball insurance system. Foot-ball players are insured against fatal accidents for the sum of £100. A penny secures this benefit, in addition to buying the paper.

PERSONALS.

We desire the earnest co-operation of every person who has ever been connected with the college in trying to make this department an interesting one. Let every alumnus and every person who has been with classes here send in news to the editor of this department, often, thus making his work much easier and the department more interesting to all.

This is what a graduate who withholds his name, says: The more I know, the prouder I become of old M. A. C. I used to think that much of the talk by the professors we had then was mere taffy, but I begin to realize now that what they said was true.

'61.

C. E. Hollister, ex-county surveyor of Clinton County, is farming at Laingsburg, Mich.

'62.

Frank Hodgman has been an invalid for the last six months. It is probable that he will be unable to read the poem at the triennial reunion in August.

'68.

Frank P. Davis is resident engineer in charge of the survey and construction of the Nicaragua Canal. While conducting President Warner Miller's party over the line recently he gave himself accidentally a severe cut upon the foot with a hatchet.

'77.

Chas. Bloodgood has been located in Kalamazoo almost three years, and has established a fine practice as physician and surgeon. He is an active member of the Kalamazoo Academy of Medicine, and attending physician to Roger's Hospital. He says that he is occasionally made happy by visiting some old college student and talking over old times had at M. A. C.

'78.

H. E. Emmons, a grain dealer of Detroit, has a business that gives him few moments of leisure. Mr. Emmons has a grain business that amounts to about \$300,000 for the city trade, while the shipping and receiving is nearly the same. He has invested in a small fruit farm in California, from which he expects, in a few years, large returns. He is treasurer and director of one or two clubs in the city. He regrets that he hears but little from other members of his class, and hopes the reason that he does not is because they have as much business to attend to as he has. He hopes to meet them all at the reunion.

WITH '78.

Wilford Macklim is editor of the *Croswell Democrat*, one of the leading papers of Sanilac County. He is also a prosperous and prominent attorney of Croswell, Mich.

'79.

A card bearing the compliments of Allegan Lodge, No. 111, F. & A. M., announces among the officers of the lodge the name of Thos. E. Dryden, W. M. Mr. Dryden is a flourishing hardware merchant of Allegan.

'81.

D. S. Lincoln, a prosperous fruit grower of Big Rapids, Mich., lately had presented to him a ten-pound daughter. Daniel says he can't talk of business now. Who could?

C. W. McCurdy, upon the request of a professor of the Minnesota University, has been elected an officer of the Minnesota Academy of Sciences. He is soon to prepare a bulletin on the work done at the laboratories of the High Schools of the State.

'82.

J. E. Coulter is in the employment of the Capital Wagon Company at Lansing, Mich. Mrs. Coulter, *nee* Alice Weed, of the same class, is an organist in Lansing.

J. M. Smith is principal of the High Schools at South Bend Falls, N. Y.

'84.

W. V. Sage, who has been principal of the Hartford schools for the past three years, will conduct, during this summer, a normal school, for the benefit of the teachers of his county.

W. A. Dothany is to be married on the third of June, in Detroit. He is paying teller in one of the city banks. Congratulations will be in order at the triennial reunion in August, which he and his bride will attend.

W. C. Stryker, formerly a druggist at Los Angeles, Cal., has now returned to old Michigan, and is running an extensive farm at Dayton, Mich.

'86.

J. E. Hammond is superintendent of schools at North Adams, Mich.

John Hooker is a 1,200 acre farmer at New Baltimore, Mich.

WITH '86.

Guy Osborne is still unmarried and as red-headed as ever. He is living at Elkhart, Ind., and spends most of his time on the road in the interests of a wholesale drug house.

'87.

C. E. St. John, lately assistant professor of chemistry at the Michigan State Normal, reports his address to be Yates, N. Y.

Chas. S. Whitmore is a farmer near Lansing. He and Mrs. Whitmore, *nee* Jennie Tower, unite in wishing the college and THE SPECULUM success.

WITH '87.

John L. Dawson is at Ulsaladee, Washington, on business.

Earnest Graham died in Texas late in April last. He was working successfully in the lumber business and leaves many friends who mourn his death.

'88.

L. H. Dewey was lately tendered the professorship of botany in the Arizona Agricultural College, which he declined, preferring his present employment. Mr. Dewey goes to the Pacific coast this summer with Dr. Vasey on a botanizing expedition.

The *Kansas Industrial* notes the receipt by Dr. N. S. Mayo, of a new and complete outfit of veterinary apparatus for his laboratory. Ned and Mollie anticipate returning to M. A. C., to be present for Commencement, and also the Triennial.

John C. Stafford was married May 14 to Miss Marion Warner of Jefferson, Ohio. John and his bride have made their home on a large farm in Van Buren county, where we wish them many years of happiness.

In our last issue we noted the fact that A. B. Cordley had taken the civil service examination for a position in entomology under Dr. Riley at Washington. At the present time Mr. Cordley is enjoying the work he applied for. He has in charge the experimental work in entomology throughout the United States and these duties call him to every State in the Union.

L. A. Bregger of Buena Park, Illinois, writes, "What is the matter with the May SPEC.? If out, send me a copy, can't do without it."

H. E. Harrison will continue to assist Dr. Kedzie in the chemical laboratory.

Miss Mary Harrison is visiting friends at the college, where she will stay during the summer.

WITH '88.

J. A. Thompson will be principal of the Luther High School for the ensuing year. He will be present at the reunion.

'89.

Hobart A. Stewart is reporter for the *Flint Evening Journal*.

A. L. Marhoff is assistant city engineer in Battle Creek, Michigan, and is rushed with business.

Mary Smith of Ithaca, N. Y., will spend the summer visiting old friends at M. A. C.

J. W. Toumey, assistant to Dr. Beal at M. A. C., has been appointed Professor of Botany in the Arizona Agricultural College at a salary of \$1,200 for the first year.

R. J. Cleland is at present studying law in an office in Grand Rapids. He will enter the University in October and continue his work there. Miss D— is also expected to return at the same time.

'90.

G. E. Hancorne, after teaching a year, has returned to spend his summer vacation studying in a special line of work at M. A. C.

E. J. Rowley for the past two months has been seriously ill. He is now slowly regaining his health. In flesh Elmer looks as if he had been training down for Field Day.

J. H. Freeman has gone to Washington, D. C., where he is engaged in the United States Patent Office.

Wm. Petrie returned to M. A. C. last April from Cleveland and now succeeds Mr. Freeman as foreman in a Grand Rapids machine shop.

H. L. Bunnell finds St. Louis, where he is engaged in the city surveyor's office, growing more like home the longer he stays. But yet he thinks it is like all other cities—one's path is not strewn with roses.

H. Z. Ward's address is 16 McCormick St., East Saginaw. He is in the employment of the Penn Mutual Life Insurance Company, an old and reliable company. His situation is a permanent and profitable one. It affords him a chance to use that immense stock of natural ability of his, which we believe adapts him to his chosen work.

L. W. Spaulding returned from Cleveland the first of May, bringing with him Chas. Hulburd who had been taken sick while at work. Mr. Hulburd is regaining health in Lansing while Mr. Spaulding has returned to work again.

WITH '91.

Adam Foster is superintendent in one of the departments of the Michigan Central Car-wheel Works in Detroit, Michigan.

C. S. Perrin spent several days at M. A. C., talking over old ball games late last term. He is at work in Saginaw.

W. A. Fox has been elected superintendent of schools of Noble Co., Indiana. Mr. Fox is a good Democrat and a hustler. He has the best wishes of '91 and all connected with M. A. C.

In our last issue of "SPEC" it was stated that W. J. Graves could be seen any time in Adrian. We should have included that if you want a bicycle, "Kodak" or any article in the line of sporting goods, Walter can furnish them. He has a flourishing trade. He is president of a tennis and athletic club composed in part of college men. He will be present at Commencement.

WITH '92.

C. D. Bowen is in partnership with his father and they are publishing a weekly paper in Mt. Pleasant.

WITH '93.

R. S. Welsh is teaching school at Stephensburg and says he is growing round shouldered in longing to return to college. He will return and graduate with '94 if possible.

The teaching force in all schools in the United States numbers 400,000.

COLLEGES.

The majority of students at Yale come from the west.

Cornell has registered 500 students in chemistry this year.—*Ex.*

Dartmouth's alumni have furnished thirty-seven college presidents.—*Ex.*

There are in America 441 educational institutions with the right to confer degrees.

An addition of over 16,000 volumes has been made to the Columbian library during 1890.

The University of Michigan will erect a Grecian temple as her contribution to the World's Fair, at Chicago.

The Methodist colleges in Georgia have graduated altogether more than three thousand young ladies and only about one thousand boys.

One man in 5,000 takes a college course in England, one in 615 in Scotland, one in every 213 in Germany and one in 2,000 in the United States.—*Ex.*

It is stated on good authority that no graduate of Harvard addicted to the use of tobacco has taken the first honors of his class for fifty years. We think this has equally been true in the history of the Michigan Agricultural College.

The graduating class of the Chautauqua Circle for 1890 was 3,645. There are over 25,000 alumni. This great body of graduates, scattered over the whole world, are in the main, true to the foundation principle of Chautauqua:—education ends only with life.—*Ex.*

The following is the wealth of the leading universities and colleges in the land:

Harvard,	\$5,190,172
Northwestern,	2,427,000
Cornell (N. Y.),	6,300,000
Bryn Mawr (Pa.),	1,110,000
Johns Hopkins,	3 650 000

EXCHANGES.

The *Echo* contains a commendable essay on "The Value of Education."

An article worthy of commendation in the "*Earlhamite*" is "The Wastes of Life." It is full of valuable and practical suggestions.

Learned men tell us that in Latin the word editor means "to eat." In the United States it means to scratch around like blazes to get something to eat.—*Ex.*

Among our interesting exchanges is the *Notre Dame Scholastic*. The literary articles are the very best. We are sorry to say that the exchange column is left out.

Teacher in elementary German.—Now, Miss—you may decline a kiss.

Miss—(slowly)—Excuse me, but I don't believe a kiss can be declined. I never could decline one.—*Ex.*

A VICTIM.

Indignant Citizen.—I have used this same butter for two years and it has never been found fault with before.

Complaining Student (mildly).—Don't you think a little change would be beneficial.—*Princeton Tiger.*

WORST OF ALL.

The man who plays the clarinet,
The man who blows the horn,
The man who makes the flute his pet,
And wakes you up at morn ;
The man who plays the tenor drum
May put the soul on thistles,
But the one who oftenest makes you glum
Is the blooming wretch who whistles.

Notre Dame Scholastic.

A religiously inclined student was found poring over a Bible one day and industriously making notes. After several hours he laid down the book with a sigh of relief. "Well, have you found much consolation?" asked his chum. "Yes, much," he responded. "You know I failed to pass last term. Well, look here," and he shoved the paper across the table. It contained the following: Thou shalt not pass—Numbers 20:18. Suffer not a man to pass.—Judges 3:28. The wicked shall no more pass.—Nahum 1:15. Neither doth any son of man pass.—Jeremiah 1:43. Beware that thou pass not.—2 Kings 6:9. None shall pass.—Isaiah 36:10.—*Ex.*

ATHLETICS.

Fully two hundred of the students and officers of M. A. C. attended the fourth annual field-day of the Michigan Intercollegiate Athletic Association at Olivet College, June 4th, 5th and 6th.

On the afternoon of the 4th a special train of four coaches left Lansing, filled with the wearers of the M. A. C. green of every conceivable shade. A large number of our ladies accompanied us and Profs. Cook, Davenport, Crittenden, Noble, Woodworth and Thurtell represented our faculty.

The day was cold and the sky black with clouds, and the field-day delegation, though in the best of spirits and confident of winning laurels, was not a noisy one.

Olivet Station was reached shortly before three o'clock and a drive of two and one-half miles brought us to the quiet and picturesque little village of Olivet, where we met with a warm reception from the hospitable Olivet boys. The capacity of Olivet to entertain guests was stretched to its utmost in providing for the 500 students present from the other colleges, but students, professors and citizens were most kind and hospitable, and all were finally made comfortable.

The two events scheduled for Thursday afternoon were base-ball between Olivet and Hillsdale and football between Olivet and M. A. C., but Hillsdale found it impossible to arrive in time and forfeited their game, and M. A. C. allowed Olivet to take the football game by failing to contest for it. Two football elevens were made up of Olivet and M. A. C. players, and an exhibition game played.

Olivet has an excellent field for sports, and a good quarter mile track for the racing. A grand stand with a seating capacity of 500 or 600 people had been erected and a good opportunity for viewing all the sports with comfort was afforded.

The evening reception at Shipherd Hall was largely attended and very enjoyable.

Friday morning opened bright and fine, and the sports began promptly at eight o'clock with the field sports at the grounds and the lawn tennis contests contemporaneously at the Parsons Hall court.

The results of the forenoon's contests were as follows:

Tennis Doubles.	Winner.	Record.
Hillsdale vs. Albion.....	Hillsdale.....	2-0
M. A. C. vs. Olivet.....	Olivet.....	2-0
Contest.	Winner.	Record.
100 yds. dash	{ 1. Rickard of Albion	10 1-5
	{ 2. Mulheron of M. A. C.	
Throwing 16 lb hammer.	{ 1. Burnett of M. A. C.....	80 ft. 10 in.
	{ 2. Williams of Hillsdale.....	68 ft.
Putting 16 lb shot.	{ 1. Burnett of M. A. C.....	33 ft.
	{ 2. Polhamus of M. A. C.....	32 ft. 10 in.
880 yds. Safety	{ 1. Mitchell of M. A. C.	1 min. 41 3-5 sec.
Bicycle Race	{ 2. Williams of Hillsdale	
Broad Hand	{ 1. Monroe of M. A. C.....	16 ft. 3 in.
Spring Jump	{ 2. Sagendorph of M. A. C.,.....	10 ft. 7½ in.
High Handspring	{ 1. Hubbard of Albion,	4 ft. 6 in.
Jump	{ 2. Monroe of M. A. C.,.....	4 ft. 5 in.
High Somersault,	1. Thomas of Hillsdale,.....	4 ft. 6 in.
50 yards Backward Dash,	1. Polhamus, M. A. C.....	8 1-5 sec.
220 yards Dash	{ 1. Rickard of Albion.	
	{ 2. Haskins of M. A. C.	

Standing Hop, Step and Jump	{ 1. Burnett of M. A. C.....	29 ft. 1 in.
	{ 2. Poss of M. A. C.,.....	28 ft. 8 in.
Running Hop, Step and Jump	{ 1. Burnett of M. A. C.,.....	41 ft. 1½ in.
	{ 2. Thomas of Hillsdale	40 ft. 1½ in.

The record made in the 220 yards dash above was 21 and 2-5 seconds, beating the world's record. A remeasurement showed the course run to have been only 203 yards. The contest was allowed to stand however.

Following these sports came the base-ball game between M. A. C. and Albion, which was an exciting contest, and worked the enthusiasm of the colleges to a high pitch. Burnett was hit freely in the fourth inning, but pitched a good game. The fielding was excellent, and the game well played throughout,

The score:

M. A. C.	AB	R	BH	E	Albion.	AB	R	BH	E
Wilson, c.....	5	1	3	3	Allen, l f.....	5	1	0	0
Burnett, p.....	5	2	2	0	Snell, c.....	5	1	3	0
C. F. Rittinger, ss.....	5	1	4	0	Bartley, p ..	5	0	2	0
J. Rittinger, l b.....	5	1	4	0	Austin, 3b.....	5	1	0	0
Weideman, 2b.....	5	2	2	1	VanLoo, lb.....	5	1	1	2
Munn, 3b.....	4	0	0	4	Bradner, c f.....	5	1	2	1
Chase, l f.....	4	1	1	2	Shultz, ss.....	5	1	0	2
Stow, r f.....	4	2	2	0	Mulhollen, r f.....	4	1	3	0
Gibbs, c f	4	1	2	0	Landon, 2b	4	1	2	1
Totals	41	11	20	10	Totals.....	43	8	13	6

Earned runs—M. A. C. 7, Albion 6 3-Base Hit, M. A. C. 1. 2-Base Hits, M. A. C. 2, Albion 2. Stolen bases, M. A. C. 6, Albion, 3. Base on balls, M. A. C. 2. Struck out by Burnett 9, by Bartley 6. Umpire, K. D. Keyes.

In the afternoon the sports at the grounds were carried on contemporaneously with the tennis singles, which resulted as follows:

Macomber of Hillsdale beat Maywood of Albion 12-10, 6-1, and Kester of Olivet won from Thurtell of M. A. C., 5-7, 6-4, 6-1.

The afternoon contests resulted as follows:

Contest.	Winners.	Record.
Pole Vaulting.	{ 1. Bradford of M. A. C. 2. Lee of Olivet	{ 8 ft. 7 in. 8 ft. 6 in.
Standing High Kick.	{ 1. Bernart of M. A. C. 2. Monroe of M. A. C.	{ 19 in. 16½ in.
Running High Kick.	{ 1. Borton of Olivet 2. Mulheron of M. A. C.	{ 8 ft. 5 in.
Hitch and Kick	{ 1. Borton of Olivet 2. Mulheron of M. A. C.	{ 8 ft. 4 in.
High Kick with Both Feet.	{ 1. Burnett of M. A. C. 2. Stine of Olivet.	{ 6 ft. 9½ in. 6 ft. 8½ in.
800 Yards Run.	{ 1. Ward of Hillsdale. 2. McKay of Olivet.	{ 2 min. 10 2-5 sec.
Standing Broad Jump	{ 1. Burnett of M. A. C. 2. Flag of Olivet.	{ 10 ft. 4 in. 10 ft. 1½ in.
Running Broad Jump	{ 1. Burnett of M. A. C. 2. Tuttle of Olivet	{ 17 ft. 11 ½ in. 17 ft. 9 in.
Standing Three Jumps.	{ 1. Purne.t of M. A. C. 2. Poss of M. A. C.	{ 31 ft. 4½ in. 30 ft. 10 in.
440 Yards Bicycle Race.	{ 1. Mitchell of M. A. C. 2. Williams of Hillsdale.	{ 43 4-5 sec.
Fancy Bicycle Riding.	—Belcher of Olivet.	
220 Yards Hurdle Race	{ 1. Rickerd of Albion 2. Frost of Olivet.	{ 28 3 5 sec.

Mr. Lee of Olivet, had the misfortune to dislocate his arm while pole vaulting.

The sports passed off quite promptly and the records made were in almost every instance a marked improvement over those of the previous year. At four o'clock the ball game between the winners of previous contests was called and proved to be another close and exciting game, well played throughout. Wilson pitched three innings for M. A. C. and was hit hard in the third. At the end of the first half of this inning the score was seven to two in favor of Olivet and great excitement prevailed among the home crowd. Burnett finished the game and was not hit to any extent. The enthusiasm culminated in the ninth inning when the Olivet students undertook by cheers, horn-blowing and general uproar to inspire their players and pull the game out of the fire. They were successful in getting two runs, but failed to win the game. As soon as the last man was out M. A. C. went wild with excitement, and carried their players about on their shoulders, yelling and tossing hats, canes and anything within reach into the air.

The score by innings.

	1	2	3	4	5	6	7	8	9	R.	BH.	E.
M. A. C.	2	0	4	0	3	0	1	0	—	10	21	14
Olivet	1	0	6	0	0	0	0	0	2	9		10

Earned runs, M. A. C. 4, Olivet 5, 3 Base-hit, Olivet 1. 2 Base hit, M. A. C. 1. Stolen Bases, M. A. C. 5, Olivet 3. Bases on called balls, M. A. C. 8. Struck out by Wilson 6, by Burnett 9, by Palmet 14. Passed balls, Warren 4. Wild pitches by Wilson 2, by Palmet 1. Umpire, K. D. Keyes.

For the evening entertainment a tent was stretched

from the front of the grand stand. This was crowded to its fullest capacity. An excellent band from Charlotte played during the evening.

Mr. Lyon of Olivet won the horizontal bar performance, with Mitchell of M. A. C. second.

The other contests resulted as follows:

Boxing, Feather-Weight.	{ 1. Tracy..... 2. Smith.....	{ M. A. C. Hillsdale.
Boxing, Light-Weight.	{ 1. Williams..... 2. Brooks.....	{ Hillsdale. Olivet.
Boxing, Middle-Weight.	—Bolt.....Hillsdale.	
Boxing, Heavy-Weight.	{ 1. Polhamus..... 2. Bolt.....	{ M. A. C. Hillsdale.
Wrestling—		
Catch-as-Catch-Can, Feather-Weight.	{ 1. Sera..... 2. Rednor.....	{ M. A. C. Olivet.
Catch-as-Catch-Can, Light-Weight.	{ 1. Sagendorph..... 2. Lyon.....	{ M. A. C. Olivet.
Catch-as-Catch-Can, Middle-Weight.	{ 1. Thomas..... 2. Collins.....	{ Hillsdale. Hillsdale.
Catch-as-Catch-Can, Heavy-Weight.	{ 1. Collins..... 2. Thomas.....	{ Hillsdale. Hillsdale.

The side hold wrestling was finished Saturday morning and resulted as follows.

Side-Hold, Light-Weight.	{ 1. Williams..... 2. Sagendorph.....	{ Hillsdale. M. A. C.
Side-Hold, Middle-Weight.	{ 1. Williams..... 2. Sagendorph.....	{ Hillsdale. M. A. C.
Side-Hold, Heavy-Weight.	{ 1. Collins..... 2. Thomas.....	{ Hillsdale. Hillsdale

The club-swinging was also deferred until Saturday morning, and was won by Williams of Hillsdale, Lyon of Olivet, second.

The weather of Saturday was not so pleasant as that of the previous day. A little rain fell during the forenoon, but did not interfere with the sports.

Lawn tennis doubles between Olivet and Hillsdale were played off and won by Obenauer and Kester of Olivet. Score, 6-4, 4-6, 6-3. At the same time the following sports took place on the grounds.

Contest.	Winner.	Record.
120 Yards Hurdle Race.	{ 1. Maywood of Albion..... 2. Haskins of M. A. C.	{ 21 3-5 sec.
Tug of-War.	—Olivet, by default.	
Three legged Race.	—Olivet, by default.	
Relay Race.	{ Rickerd, Newell, Spence } { and Pooley of Albion. }	{ 3 min. 54 sec.
Standing High Jump.	{ 1. Burnett of M. A. C. 2. Polhamus of M. A. C.	{ 4 ft. 6 in.
Running High Jump.	{ 1. Monroe of M. A. C. 2. Maywood of Albion.....	{ 5 ft. 4 ft. 6 in.

The base ball game between losers of 1st and 2d games was not played.

On Saturday afternoon the lawn tennis singles were finished, Mr. Macomber of Hillsdale winning from Mr. Kester of Olivet; 5-7, 6-4, 6-1.

The field sports of the afternoon were:

Contest.	Winner.	Record.
One Mile Bicycle Race.	—1. Mitchell of M. A. C.....3.28 min.	
440 Yards Dash	{ 1. Rickerd of Albion 2. Frost of Olivet	{ 53 3-5 sec.
Base-ball Throw.	{ 1. Gibbs of M. A. C. 2. Burnett of M. A. C.	{ 346 ft. 1 in. 333 ft. 6 in.
Passing Rugby	{ 1. Hinkley of Olivet..... 2. Wright of Olivet.....	{ 129 ft. 9 in. 127 ft. 9 in.
Drop Kick.	{ 1. Roberts of Albion 2. Snell of Albion.	{ 173 ft.

The mile bicycle race was an exciting contest, and at its finish the M. A. C. boys gave vent to their enthusiasm, carrying Mitchell and his wheel around the track amid the wildest excitement of the entire field-day. The concluding sport was the foot-ball game between Olivet and Albion, in which centered the chief interest of the two colleges. The features of the game were the playing of Upton of Olivet, and Newell of Albion, and the fine rush work of both teams. The score of the game was 30 to 21 in favor of Olivet.

The M. A. C. boys arrived in Lansing at 9 o'clock Saturday evening, and paraded the city headed by their champions and a brass band. At the college they were met with bonfires and an artillery salute of 30 guns. It was late before the enthusiasm subsided, and all were tired and hoarse.

M. A. C. has reason to be proud of her success in the sports. A summary shows :

M. A. C.	wins	22	first	prizes,	18	second	prizes.
Hillsdale	"	11	"	"	9	"	"
Olivet	"	7	"	"	12	"	"
Albion	"	8	"	"	3	"	"

In addition M. A. C. wins the baseball championship and Olivet the foot-ball.

The all-around championship was taken by Mr. Williams, of Hillsdale. Burnett, although he had won more prizes than any other contestant, had failed to qualify in the necessary number of sports, and lost the diamond medal.

The results of the contests show clearly the value of the training which our athletes have had this spring. All of our contestants were in excellent physical condition, and showed up well in everything they were entered in. We have some very promising young athletes, on whom we can safely depend for winning future laurels for M. A. C. Mulheron will develop finely as a runner and all around man, while Poss, Haskins, Bernart, Mitchell and Tracy are men of whom we are already proud, and who will, with further development and careful training, make fine records for themselves and M. A. C.

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